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WATER SUPPLY OUTLOOK FOR WASHINGTON



POOL-STEEL SECTION
CURRENT STIMUL RECORDS

JUN 15 '75

U.S. DEPT. OF AGRICULTURE
NATL. AG. REC. 17777

U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Collaborating with

DEPARTMENT OF ECOLOGY STATE OF WASHINGTON

Data included in this report were obtained by the agencies named above in cooperation with Federal, State and private organizations listed inside the back cover of this report.

AS OF
JUNE 1, 1976

TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1900 snow courses in Western United States and in the Columbia Basin in British Columbia. Networks of automatic snow water equivalent and related data sensing devices, along with radio telemetry are expanding and will provide a continuous record of snow water and other parameters at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

COVER PHOTO: *SURVEYOR ENROUTE TO THE MT. BALDY ARIZONA SNOW COURSE*
SCS PHOTO AZ-5460

PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, West Technical Service Center, Room 111, 511 N.W. Broadway, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	204 E. 5th. Ave., Room 217, Anchorage, Alaska 99501
Arizona	6029 Federal Building, Phoenix, Arizona 85025
Colorado (N. Mex.)	P. O. Box 17107, Denver, Colorado 80217
Idaho	Room 345, 304 N. 8th. St., Boise, Idaho 83702
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1220 S.W. Third Ave., Portland, Oregon 97204
Utah	4012 Federal Bldg., 125 South State St., Salt Lake City, Utah 84138
Washington	360 U.S. Court House, Spokane, Washington 99201
Wyoming	P. O. Box 2440, Casper, Wyoming 82601

PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P. O. Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resources, Water Resources Service, Parliament Building, Victoria, British Columbia



WATER SUPPLY OUTLOOK FOR WASHINGTON

and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

Issued by

R.M. DAVIS

ADMINISTRATOR
SOIL CONSERVATION SERVICE
WASHINGTON, D C

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STATE CONSERVATIONIST
SOIL CONSERVATION SERVICE
SPOKANE, WASHINGTON

In Cooperation with

JOHN A. BIGGS

DIRECTOR
DEPARTMENT OF ECOLOGY
STATE OF WASHINGTON

|||||

Report prepared by

ROBERT T. DAVIS, Snow Survey Supervisor

SOIL CONSERVATION SERVICE
360 U.S. COURTHOUSE
SPOKANE, WASHINGTON 99201

WATER SUPPLY OUTLOOK

State of Washington

June 1, 1976

* * * * *

* In spite of the below average rainfall that occurred over *
* Washington this past month, runoff was well above average. *
* What it would have been if we had normal or above precipi- *
* tation, you can well imagine. The Upper Columbia Basin in *
* Canada and the Southwest Slopes of the Cascades were the *
* only drainage divisions, as reported by the National *
* Weather Service, in which rainfall was above normal, and *
* that, 53 and 17 percent above, respectively. Rivers are *
* being managed to keep the waters within their banks, when *
* this is possible, and on unregulated streams, the flow is *
* 15 to 38 percent above normal. The snow pack is gone at *
* the low and mid elevation snow courses and is very close to *
* average at the higher elevations. *
* * * * *

SNOW COVER

Only a few Washington snow courses are measured, as of June 1, and these indicate near normal snow packs. Many of the British Columbia courses have above normal snow cover, as a result of the well above normal precipitation that occurred during the past month.

RESERVOIRS

All reservoirs are in excellent shape with normal or above amounts of water in storage. There has been some draw down of the Yakima irrigation reservoirs, to meet the irrigation water users requirements. This is a result of the recent cold weather that reduced streamflow to below diversion requirements. The Bureau of Reclamation still expects to fill their reservoirs during the last two weeks of June, but are concerned if this cool weather continues. The Okanogan Irrigation District reservoirs are full, which hasn't occurred as of June 1 for the past several years. Power reservoirs are being managed for flood control and are all expected to fill according to plan.

STREAMFLOW

As stated above, all streams had above normal outflows during the month of May. The main stem of the Columbia had a flow that ranged from 24 percent above normal at Birchbank to 32 percent above at The Dalles. The stream that had the poorest outflow was the Chehalis River, which had an outflow 9 percent above average, and the highest was the Palouse, with an outflow of 38 percent above normal.

PRECIPITATION

Rainfall over Washington was generally deficient during May, with the Pend Oreille-Spokane Drainage receiving 84 percent normal rainfall, Northeastern Washington, 87 percent and Central Washington, 72 percent. Southeastern Washington, Northcentral Washington and Northwest Slopes of the Cascades received 99 percent, 95 percent, and 98 percent normal rainfall, respectively. These preliminary figures were released by the National Weather Service.

RESERVOIR STORAGE - 1000 Acre Feet

BASIN OR STREAM	RESERVOIR	USABLE 1/ CAPACITY	1976	Measured June 1, 1976		
				1975	1974	Normal*
<u>COLUMBIA</u>						
Spokane	Coeur d'Alene Lake	225.1	269.1	326.8	397.7	299.8
Columbia	Franklin D. Roosevelt Lake	5232.0	3740.7	600.2	979.0	3239.1
Columbia	Banks Lake	761.8	648.0	507.5	204.9	446.7
Okanogan	Conconully Reservoir	13.0	13.0	12.1	11.5	10.4
Okanogan	Salmon Lake	10.5	10.5	10.5	10.5	9.3
Chelan	Lake Chelan	676.1	487.8	339.5	390.0	481.4
<u>YAKIMA</u>						
Yakima	Keechelus Lake	157.8	143.7	129.4	114.1	147.5
Kachess	Kachess Lake	239.0	226.5	191.9	196.8	226.2
Cle Elum	Lake Cle Elum	436.9	387.1	336.4	301.5	387.3
Bumping	Bumping Lake	33.7	25.8	16.9	16.6	27.7
Tieton	Rimrock Lake	198.0	177.4	142.7	148.4	172.0
<u>PUGET SOUND</u>						
Skagit	Ross Reservoir	1404.1	1034.1	736.8	808.8	708.6
Skagit	Diablo Reservoir	90.6	86.6	88.8	86.8	84.8
Skagit	Gorge Reservoir	9.8	9.2	9.0	8.9	-

1/ Based on Active Storage

* 15-year Average 1958-72

PRECIPITATION 1/

Division Average Observations and Departures

Drainage Divisions	FALL		WINTER		SPRING	
	Sept-Oct Observed	1975 <u>2/</u> Departure	Nov. 1975-- Observed	Mar. 1976 Departure	April-May 1976 <u>2/</u> Observed	Departure
Columbia in Canada	3.51	+ 0.96	13.54	+ 0.79	3.76	+ 0.53
Pend Oreille - Spokane	4.27	- 0.21	18.45	- 0.30	4.19	- 0.22
Northeastern Washington	2.29	- 0.49	9.45	- 1.66	3.14	- 0.12
Southeastern Washington	2.94	- 0.29	11.77	- 1.70	4.10	+ 0.44
Central Washington	5.47	+ 0.72	33.67	+ 6.14	2.47	- 0.84
North Central Washington	1.22	- 0.40	5.87	- 0.85	1.40	- 0.49
Northwest Slope Cascades	15.42	+ 2.73	65.16	+12.93	8.10	- 2.02
Southwest Slope Cascades	8.34	- 0.34	46.34	+ 4.70	6.61	- 0.69

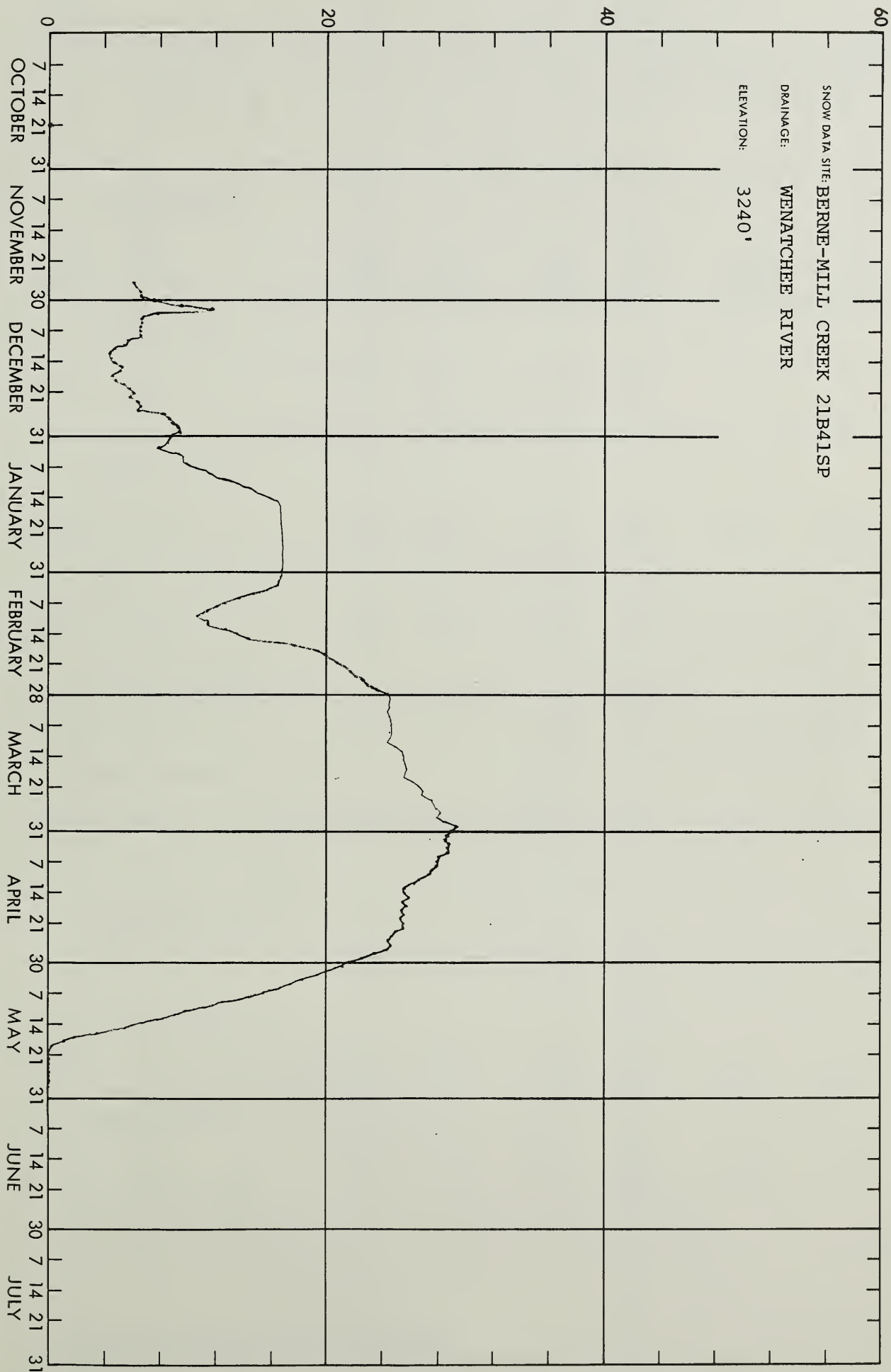
Northeastern Washington	- Lower Spokane, Colville, Sanpoil and Lower Kettle Drainages.
Southeastern Washington	- Touchet, Tucannon and Palouse Drainages.
Central Washington	- Yakima, Wenatchee and Chelan Drainages.
North Central Washington	- Methow and Okanogan Drainages.
Northwest Slope Cascades	- Puget Sound Drainages.
Southwest Slope Cascades	- Lower Columbia Drainages.

1/ - Preliminary analysis by National Weather Service from data furnished by Meteorological Services of Canada and the National Weather Service.

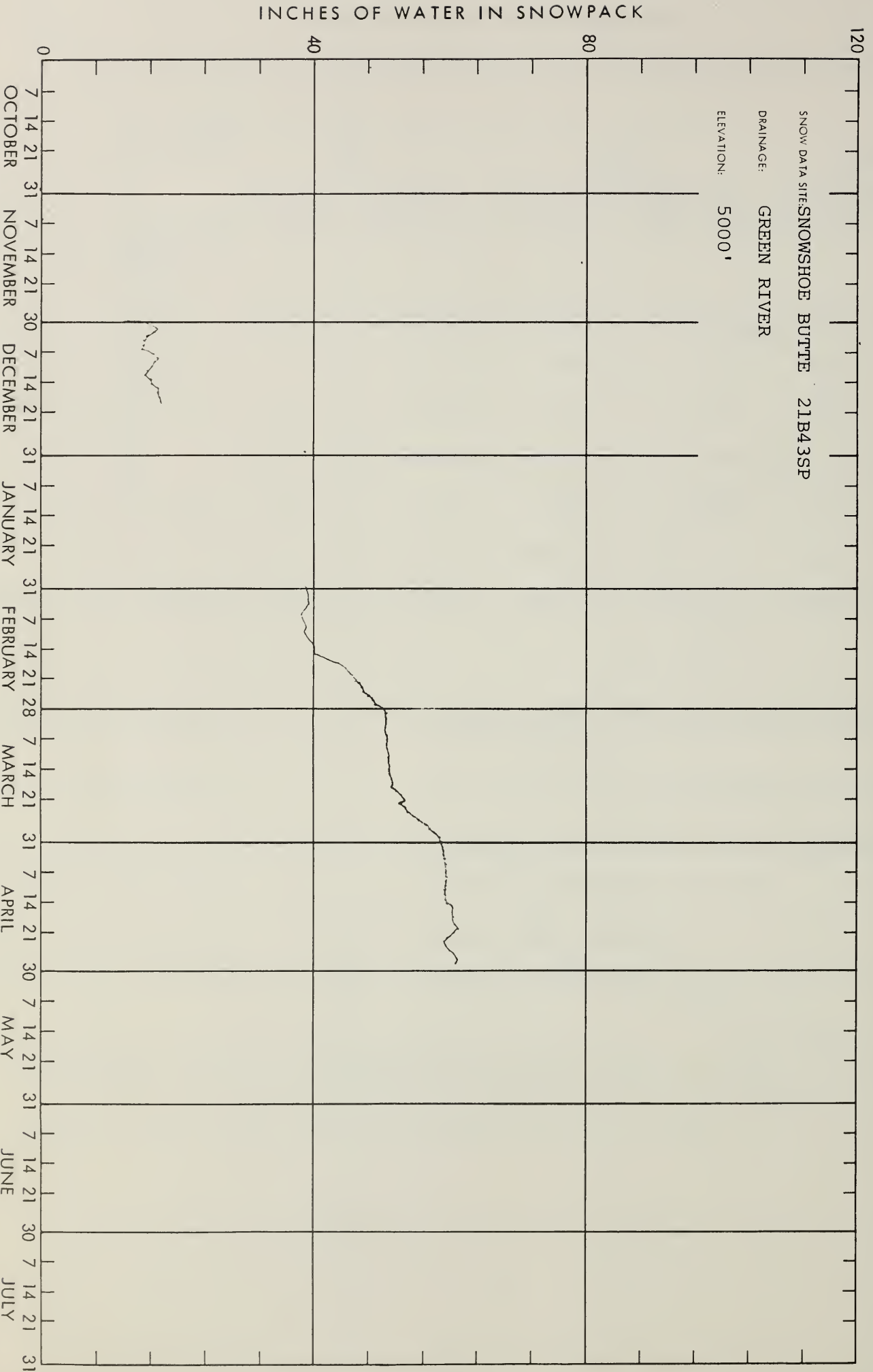
2/ - Departure from 15-year (1958-72) drainage division average.

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INCHES OF WATER IN SNOWPACK



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CORRECTIONS AND ADDITIONS - 1976 SNOW REPORTS - APPENDIX 1

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	Number	Elevation				Last Year	Average [†] _#

February 1

YAKIMA RIVER

Corral Pass	21B13	6000	1/30	80	<u>30.1</u>	-	-
Olallie Meadow	21B02	3625	1/30	79	<u>32.0</u>	-	32.7

GREEN RIVER

Cougar Mountain SP	21B42SP	3200	1/30	<u>20</u>	7.7	-	-
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March 1

YAKIMA RIVER

Olallie Meadow	21B02	3625	3/2	<u>157</u>	<u>68.3</u>	52.6	40.6
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ASOTIN CREEK

Spruce Springs	17C04	5700	3/4	<u>76</u>	25.1	26.6	23.6
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COWLITZ RIVER

Packwood Lake	21C31	2870	2/23	41	<u>13.1</u>	14.9	12.7
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BAKER RIVER

Jasper Pass	21A06A	5400	3/1	278	<u>106.0</u>	86.0	82.8
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May 1

NISQUALLY RIVER

Longmire	21C03	2760	4/26	21	<u>9.3</u>	7.6	-
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GREEN RIVER

Snowshoe Butte SP	21B43SP	5000	4/28	<u>161</u>	68.9	76.5	-
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BAKER RIVER

Baker Pass	21A27a	4900	4/29	<u>249</u>	<u>119.0</u>	99.9	-
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Average based on 1958-72 average

+ Snow water equivalent estimated from aerial stadia observation

SNOW DATA TO JUNE 1, 1976 - APPENDIX 2

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	Number	Elevation				Last Year	Average #

U P P E R C O L U M B I A D R A I N A G EPEND OREILLE RIVER

Baree Creek	15B11	5500	5/14	84	45.7	55.6	42.6
Baree Midway	15B16	4600	5/14	52	26.2	38.4	24.5
Baree Trail	15B15	3800	5/14	0	0.0	0.0	0.0
Lookout	15B02	5250	5/14	54	24.8	41.0	30.9
			5/26	31	14.6	28.8	--
Nelson	19-Can	3050	5/13	1.6	0.6	5.2	0.8*
			5/28	0	0.0	0.0	0.0*
Schweitzer Bowl	16A06	4500	5/27	0	0.0	--	--
Schweitzer Ridge	16A05	6100	5/27	50	24.0	--	--

KETTLE RIVER

Big White Mtn.	154-Can	5500	5/15	52	18.5	23.5	17.8*
Carmi	126-Can	4100	5/15	0	0.0	0.0	0.0*
Farron # 1	17-Can	4000	5/15	8.7	3.3	5.4	-- *
Farron # 2	243-Can	4000	5/14	9.0	3.1	6.8	-- *
Monashee Pass	48A-Can	4500	5/14	20	9.0	8.9	9.4*
			6/2	6.3	2.6	1.2	2.0*
Trapping Creek Lower	166-Can	3050	5/15	0	0.0	--	0.0*
Trapping Creek Upper	165-Can	4450	5/15	0	0.0	0.0	0.5*

SPOKANE RIVER

Granite Peak	15B13A	6000	6/1	Late Report		42.1	--
Lookout	15B02	5250	5/14	54	24.8	41.0	30.9
			5/26	31	14.6	28.8	--
Lost Lake	15B14A	6000	6/1	Late Report		58.2	--
Medicine Ridge	15B04A	6150	6/1	Late Report		43.4	--

OKANOGAN RIVER

Blackwall Mountain	100-Can	6250	6/1	76	37.6	26.5	29.1*
Brenda Mine	193-Can	4800	5/15	0	0.0	3.1	2.9*
Brookmere	27-Can	3200	5/15	0	0.0	5.0	2.9*
Enderby	130-Can	6250	5/14	103	44.1	44.3	45.2*
			5/31	103	45.9	42.1	40.0*
Esperon Creek Lower	164-Can	4400	6/1	0	0.0	0.0	0.0*
Esperon Creek Middle	163-Can	4700	6/1	0	0.0	0.0	0.0*
Esperon Creek Upper	162-Can	5400	6/1	0	0.0	14.0	5.9*
Hamilton Hill	107-Can	4900	5/14	21	8.7	10.2	6.5*
			6/3	0	0.0	--	2.0*
Isintok Lake	152-Can	5510	5/14	6	2.8	7.8	4.8*

Average based on 1958-72 average

* Average for years of record

SNOW DATA TO JUNE 1, 1976 - APPENDIX 3

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	
NAME	Number	Elevation				Last Year	Average †

OKANOGAN RIVER (Cont.)

Lost Horse Mountain	105-Can	6300	5/17	15	5.8	9.6	10.3*
			6/1	11	4.3	6.6	4.2*
McCulloch	4-Can	4200	5/13	0	0.0	0.2	0.6*
Missezula Mountain	106-Can	5100	5/14	0	0.0	6.4	1.9*
Mission Creek	5A-Can	6000	5/13	47	21.7	23.3	19.1*
			5/31	43	16.8	20.0	11.4*
Monashee Pass	48A-Can	4500	5/14	20	9.0	8.9	9.4*
			6/2	6.3	2.6	1.2	2.0*
Mount Kobau	156-Can	5950	5/14	20	6.4	14.1	10.0*
			5/31	11	1.9	8.3	2.0*
New Copper Mountain	46A-Can	4300	5/15	0	0.0	-	-
New Penticton Res. #2	183-Can	5225	5/15	9	3.4	8.4	7.3*
			5/31	0	0.0	1.4	-
Silver Star Mountain	99-Can	6050	5/15	58	29.4	32.6	26.0*
			5/31	47	22.6	25.6	15.5*
Summerland Reservoir	3A-Can	4200	5/14	1.2	0.5	8.1	2.3*
Trout Creek	3-Can	4700	5/12	2.0	0.4	5.4	1.7*
Vaseux Creek	233-Can	4600	5/15	0	0.0	0.0	0.5*
White Rocks Mountain	70-Can	6000	5/15	30	14.1	26.3	20.8*
			5/27	13	6.3	19.1	-

ENTIAT RIVER

Blue Creek G. S.	20B28a	5425	5/28	65	34.2	41.6	-
Entiat Meadows +	20A33a	4540	5/28	48	25.2	36.7	-
Entiat River Trail +	20A34a	3325	5/28	0	0.0	0.0	-
Four Mile Ridge +	20B27a	6800	5/28	60	31.6	35.1	-
Fox Camp +	20A36a	6510	5/28	130	68.4	76.7	-
Pope Ridge	20B20	3540	5/28	0	0.0	0.0	-
Pugh Ridge +	20A32a	6725	5/28	57	30.0	32.9	-
Shady Pass	20A37	6200	5/28	38	20.0	19.6	-
Snow Brushy +	20A35a	3910	5/28	0	0.0	24.3	-
Tommy Creek +	20B21a	4900	5/28	0	0.0	6.5	-

CHELAN LAKE BASIN

Cloudy Pass +	20A22a	6500	5/14	119	57.1	-	-
Little Meadows +	20A24a	5275	5/14	100	48.0	52.8	-
Lyman Lake	20A23A	5900	5/14	150	72.2	72.0	-
Park Creek Ridge	20A12A	4600	5/14	97	46.6	46.6	-

WENATCHEE RIVER

Stevens Pass	21B01	4070	5/14	109	54.3	56.7	48.3
			5/28	88	45.2	59.4	36.5
Stevens Pass Sand Shed	21B45	3700	5/14	60	29.4	34.1	-
			5/28	35	17.6	30.2	-

Average based on 1958-72 average

* Average for years of record

SNOW DATA TO JUNE 1, 1976 - APPENDIX 4

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	
NAME	Number	Elevation				Last Year	Average [†]

YAKIMA RIVER

Bumping Lake	21C08	3450	5/14	4.4	1.8	5.0	1.8
			6/1	0	0.0	0.0	-
Bumping Lake New	21C36	3400	5/14	14	5.6	11.1	-
			6/1	0	0.0	0.0	-
Lake Cle Elum	21B14M	2200	5/15	0	0.0	-	-
			6/1	0	0.0	-	-
Stampede Pass SP	21B10SP	3860	5/14	-	30.6	47.1	33.6
			5/27	-	26.4	41.2	18.8
Tunnel Avenue	21B08	2450	5/14	20	8.9	19.2	7.9
			6/1	0	0.0	6.3	-
White Pass (E. Side)	21C28	4500	5/28	32	14.5	21.6	13.6

LOWER COLUMBIA DRAINAGECOWLITZ RIVER

White Pass (E. Side)	21C28	4500	5/28	32	14.4	21.6	13.6
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PUGET SOUND DRAINAGEGREEN RIVER

Stampede Pass SP	21B10SP	3860	5/14	-	30.6	47.1	33.6
			5/27	-	26.4	41.2	18.8

SKYKOMISH RIVER

Stevens Pass	21B01	4070	5/14	109	54.3	56.7	48.3
			5/28	88	45.2	59.4	36.5
Stevens Pass S. Shed	21B45	3700	5/14	60	29.4	34.1	-
			5/28	35	17.6	30.2	-

BAKER RIVER

Baker Pass +	21A27a	4900	5/14	216	108.0	102.0	-
			6/1	Late Report		102.0	-
Dock Butte +	21A11A	3800	5/14	166	83.0	73.0	72.7
			6/1	Late Report		74.0	58.0
Easy Pass +	21A07A	5200	5/14	200	100.0	94.0	90.2
			6/1	Late Report		93.0	73.6
Jasper Pass +	21A06A	5400	5/14	226	113.0	103.0	114.7
			6/1	Late Report		115.0	84.2
Marten Lake +	21A09A	3600	5/14	196	98.0	84.0	81.3
			6/1	Late Report		84.0	66.2
Mount Blum +	21A18a	5800	5/14	172	86.0	86.0	-
			6/1	Late Report		93.0	-
Panorama New	21A26	4300	5/30	128	74.2	-	-
Rocky Creek +	21A12A	2100	5/14	62	31.0	27.0	12.1
			6/1	Late Report		5.0	-

Average based on 1958-72 average

+ Snow water equivalent estimated from aerial stadia observation.

SNOW DATA TO JUNE 1, 1976 - APPENDIX 5

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	Number	Elevation				Last Year	Average ⁺ _#

BAKER RIVER (Cont.)

Schreibers Meadow +	21A10A	3400	5/14	144	72.0	55.0	61.7
			6/1	Late Report		62.0	48.6
S. F. Thunder Creek +	21A14A	2200	5/14	0	0.0	-	0.0
Watson Lakes +	21A08A	4500	5/14	146	73.0	60.0	73.5
			6/1	Late Report		79.0	61.4

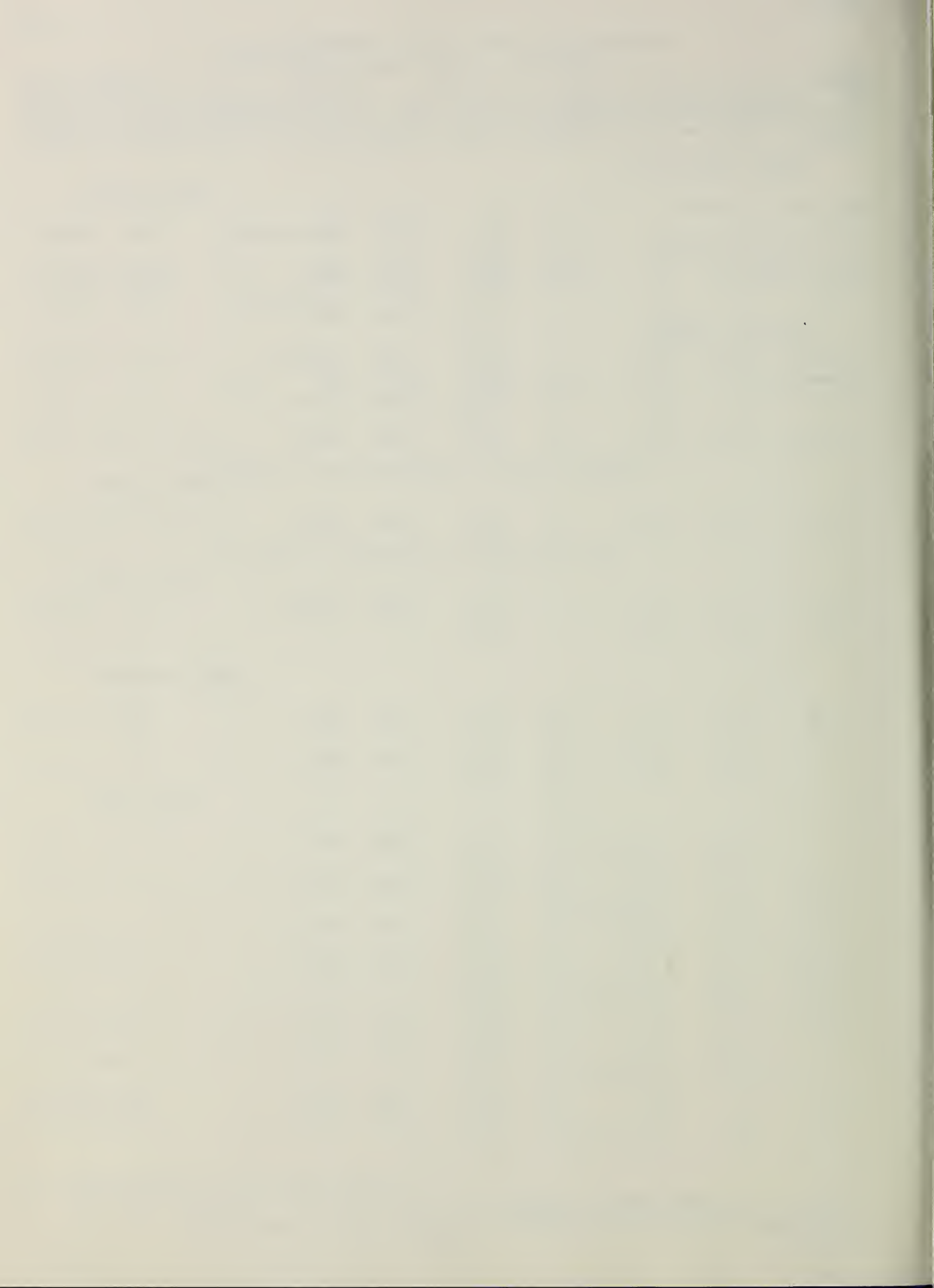
NOOKSACK RIVER

Panorama New	21A26	4300	5/30	128	74.2	-	-
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Average based on 1958-72 average

+ Snow water equivalent estimated from aerial stadia observation.

USDA SCS PORTLAND OREGON 1973



Agencies Assisting with Snow Surveys

GOVERNMENT AGENCIES

Canada:

Department of Lands, Forests and Water Resources,
Water Resources Service, British Columbia

States:

Washington State Department of Ecology
Washington State Department of Natural Resources

Federal:

Department of the Army
Corps of Engineers
U. S. Department of Agriculture
Forest Service
U. S. Department of Commerce
NOAA, National Weather Service
U. S. Department of the Interior
Bonneville Power Administration
Bureau of Reclamation
Geological Survey
National Park Service

PUBLIC AND PRIVATE UTILITIES

Chelan County P.U.D.
Pacific Power and Light Company
Puget Sound Power and Light Company
Washington Water Power Company

OTHER PUBLIC AGENCIES

Okanogan Irrigation District
Wenatchee Heights Irrigation District

MUNICIPALITIES

City of Tacoma
City of Seattle

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ROOM 360, U.S. COURT HOUSE
SPOKANE, WASHINGTON 99201

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water supply for irrigation,
domestic and municipal water
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generation, navigation,
mining and industry

*"The Conservation of Water begins
with the Snow Survey"*